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No. 4—Diseases of the Digestive System of Young Pigs*

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Troubles of the intestinal tract in young pigs are of great practical significance.

Of the diseases of the intestinal tract, gastro-enteritis is the most prevalent. It may occur at any time between birth and the post-weaning period. There are two periods, however, when it is especially of frequent occurrence—at the time immediately after birth and after weaning. Therefore special practical importance must be attached to gastro-enteritis which causes such serious damage among both new-born and weaned pigs.

Concerning the aetiology of the *gastro-enteritis of new-born pigs* (*piglet dysentery*), ideas have changed in course of time, just as they have with many other diseases brought about by the activities of facultative pathogenic bacteria. The cause of dysentery, before the development of the bacteriological era, was attributed to unfavourable hygienic conditions alone. Following the introduction of bacteriological methods, several micro-organisms were described as having aetiological relations with gastro-enteritis of new-born pigs. Of these I will especially emphasise the following: the *Bacterium* (*Escherichia*) *coli*, *Bacterium aerogenes*, *Bacterium pyosepticum*, some species of Salmonella, Streptococci and a variety of *Clostridium welchii*, similar to *Clostridium agni*. We know all these, without exception, to be facultative pathogenic bacteria, which always occur in the bodies or the surroundings of our domestic animals. For a time it was customary to attribute to these bacteria the whole cause of dysentery. On the basis of this conception, for a time, specific preventive measures consisted in inoculation with serums and vaccine. However, we are obliged to confess that this method was attended by so small a measure of success that even in cases where after inoculation there were fewer or no deaths at all, we were obliged to think that this improvement was due rather to the change of other circumstances.

The failure connected with specific measures caused me also, just after the World War, to look more deeply into this problem. As early as 1928 on the basis of practical research, I had to conclude that the dysentery of new-born pigs was really caused by one or another of the above-mentioned bacteria, but only if certain circumstances promoting increased susceptibility, weakened the resistance of the young organism. These influences causing increased susceptibility prevail in the organism of the new-born, all the more so, since in the new-born, we must always reckon with an anatomical predisposition, as the epithelial layer in the new-born is not yet covered by Disse's mucous zone.

In accordance with our present knowledge, the susceptibility of new-born pigs to dysentery is either due to congenital weakness, or develops after birth owing to the unfavourable conditions suffered by the pigs in post-natal life.

We do not yet know whether the congenital constitutional weakness may be—or to what extent it is—a special inherited quality. Thorough research would be desirable in this direction. We do know, however, that the congenital weakness may be determined by the fate of the foetus in its intra-uterine life. Very often congenital weakness is the result of infection of the foetus by Brucellae within the uterus. It is not yet known how far developed is brucellosis (infectious abortion) among pigs in the various countries. Where brucellosis occurs, however, this disease is doubtless of great importance in the mass development of

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dysentery among young pigs. The Brucellae, as is well known, multiply in pregnant sows, in the foetal membranes and in the foetus, as well as in the mucous membrane of the uterus. In pigs the membranes of the foetuses are not connected with each other, and in cases of brucellosis not every foetal membrane need be infected. For this reason, and owing to the fact that the disease does not spread to the same extent or with the same rapidity in the infected foetal membranes and foetuses, the pregnancy of the infected sows may end in different ways. Often all the foetuses die off. In this case they are aborted by the sow. In other cases only certain of the foetuses perish during inter-uterine life and at different periods. In such cases the dead foetuses are not aborted, but at the ordinary time of parturition or perhaps somewhat earlier, the sow produces dead, partially dried up offspring, together with the live ones.

It also occurs that all the offspring are born alive in spite of their being developed within an infected uterus. It often happens, especially in breeding farms long infected with brucellosis, that sows carry their infected offspring up to the usual time of littering. Such offspring often die shortly after birth due directly to the pathological changes caused by the Brucellae. On other occasions the effect of the Brucellae is merely to cause weakness in the offspring. This renders it possible for one or another of the above-mentioned species of bacteria to gain ground in the organism of the new-born, and to bring about gastro-enteritis. From what I have already said, it is clear that in a stock where brucellosis is present, the seasons of pregnancy accompanied by abortus are followed by periods of pregnancy in the course of which more or fewer—sometimes very many—sows produce an apparently normal litter, their offspring, however, dying off in a few days from dysentery. A similar position may occur when within the uterus a bacterial infection of a differeht nature attacks the foetuses.

Debilitating diseases of the sow may also cause congenital weakness in the offspring, but for the most part this only occurs sporadically.

Very important and perhaps even more significant than brucellosis from the standpoint of the weakening of resistance in new-born pigs is the incorrect feeding of the sow during the period of pregnancy. In each separate case there is a different error in feeding which gives rise to the weak constitution of the developing foetus. Sometimes—according to my experience, this occurs very seldom—there is a lack of organic compounds, especially of protein in the food. Again, decomposed food also may cause trouble. On most occasions, however, the cause of the trouble may be a deficiency in the proportion of the quantity of mineral constituents, or there may be insufficient vitamins in the food. The importance of the correct quantity of calcium and phosphoric acid in the food as well as their proportion to each other, is well known. If the total quantity of calcium and phosphoric acid is insufficient or the balance of the two is incorrect metabolic disturbances occur in the sow to such an extent as to cause constitutional weakness of the maturing foetus. The lack of proportion in the content of calcium or phosphoric acid may be equalized by the presence of vitamin D in the food. But if this also is lacking, the maternal organism, sooner or later, becomes deficient in mineral compounds, and the offspring is born with constitutional weakness. Similarly, the lack of vitamin A in the food also renders the offspring susceptible to dysentery. Therefore it is clear that on farms where there are no pastures sufficient in size and quality, and where the sows are fed one-sidedly, especially on a factory-made food containing no vitamins, gastro-enteritis among the young pigs will be frequent. From our experience that intensive agricultural development is often accompanied by one-sided feeding of the pigs, as opposed to the natural method, we can understand that dysentery of new-born pigs occurs more and more frequently as farming becomes more and more intensive. In certain respects this disease may rightfully be called a cultural disease. We do not take this view merely because of anatomical causes (osteomalacia, rickets and osteoporosis) but the following experiences also lead me to this conclusion. In certain breeding farms I found that the offspring of the older sows perished in great numbers because of gastro-enteritis. This result is explained when we consider that the sows, because of quantitatively or qualitatively insufficient food, became increasingly poorer in minerals and vitamins after every litter. Sooner or later they must have become exhausted and after the production of repeated litters such disturbances must occur in the metabolism of the foetuses developing within them as would become objectively demonstrated in the deficiency of their resistance. But above all, the milk of such sows does not contain a satisfactory quantity of vitamins.

In post-natal life also the young pigs may be afflicted by ailments which predispose them to the development of gastro-enteritis. Owing to its being so rare, there is hardly any practical importance attached to the possibility that drinking abnormally composed milk of sows with diseased udders, may bring about a local predisposition towards gastro-enteritis by loosening the epithelial layer of the intestine of the young pigs. Much greater practical importance must be attached to the quality of the sty in connection with the resistance

capacity of the pigs. On the one hand the over-moist air of the sty, by causing a chill or retention of heat may decrease the resistance of the new-born, while on the other hand the lack of sun in dark sties also has a harmful influence on their health. In certain stock kept under such unsuitable conditions the dysentery of the pigs nearly always appears in spring or autumn. Further, it often happens that when the sows are allowed to litter in the open air there is an immediate cessation of the trouble.

I have mentioned that the facultative pathogenic micro-organisms in question are able to cause disease only in case of the co-operation of certain predispositional circumstances. Since such facultative pathogenic micro-organisms in all circumstances find their way into the new-born, either through the mouth, or through the veins of the umbilical stump, it follows that in the development of the disease the most essential rôle is played by predisposition, in other words, the reduction of resistance. There is no doubt, however, that where dysentery of the new-born appears, more young animals fall ill as the epidemic progresses. Some research workers explain this happening as due to the facultative pathogenic micro-organisms becoming increased in virulence in course of their passage through animals. This may be so, but we have no convincing proof. Others, myself included, rather believe that a satisfactory explanation of the subsequent spread of the disease is that in sties where numerous cases of disease have occurred, large numbers of bacteria enter the organism of the new-born pigs, and the organism of the new-born, especially its intestinal tract, cannot withstand the action of such large numbers. That this latter idea is correct also seems to be proved by the experience that dysentery of the new-born pig cannot be regarded as a contagious disease in the strict sense of the word. According to my experience it hardly ever affects the whole stock; on the contrary, it often happens that within the very same stock it is localised to certain litters or pens.

It seems superfluous to go into detail regarding the clinical symptoms and pathological anatomy of the disease. It is widely known that the anatomical essentials of the disease manifesting itself in diarrhoea is an inflammation of the mucous membrane of the stomach and especially of the intestines. It is sometimes catarrhal in character and sometimes is accompanied by destruction of the epithelium, in course of which the serosa may be dark-reddish in colour and gas-bubbles may be present between the layers of the mesentery (emphysema mesenteriale bullosum). It is also well known that in certain cases the disease process may confine itself to the intestinal tract while in other cases pathological changes showing general septicaemia may be established. We may also omit the details for from a diagnostic standpoint no difficulties arise.

In my opinion we must start our campaign against this disease of pigs by putting an end to the special susceptibility of the new-born animals; in other words by increasing the resistance of the young animals. In given cases it should be the most important task of the veterinary surgeon to study thoroughly the local conditions in order to establish the reason or combination of reasons why the disease was able to develop among the young animals. His further task should be to prevent the cause or causes which made the animals susceptible to the disease. With regard to this point I need not go into detail because from what I have said concerning susceptibility, it goes without saying that where the cause of the trouble is brucellosis or some other form of infectious abortion, these diseases must be prevented. On the other hand, where the fault is in the feeding, a food of correct composition should be given to the sows during the time of pregnancy, as well as during the suckling period, with special regard to the necessary mineral compounds and vitamins. Where the unpractical nature of the sties gives rise to the disease, we can prevent the epidemic from spreading by improving the sties and by placing the sows out in the open to bear their young, etc. The essential thing is to recognise the fact that there is no universal method at our disposal for the prevention of the disease but we must always decide upon our prophylactic and repressive measures on the basis of a thorough consideration of given circumstances.

The further task is to prevent excessive infection of the new-born pigs from their sick companions. For this reason it is important strictly to carry out the well-known measures with which it is possible to reduce the cases of infection. In this respect, besides the separation of the sick animals and the rigid cleanliness and disinfection of the sty, in certain cases we may also transfer the healthy stock to a hitherto unused sty or, should the weather permit, into the open.

For the purpose of prevention many have recommended the immunisation of the new-born or the mother animals. The value of the recommended methods is very doubtful. I have seen no advantage from them. Notwithstanding, in a given case should anyone wish to try the immunisation process in order to protect certain exceptionally valuable stock, my opinion is that he must not neglect the other measures. We must emphatically call the attention of all breeders to this. I believe we have all experienced the fact that breeders like to neglect the application of hygienic measures if they have had their animals inoculated.

The second period when gastro-enteritis in young pigs may appear frequently and with enzoötic character is *the period of weaning and the few weeks after it.* In this period, gastro-enteritis occurs easily because the mucous membrane of the intestines of the young animals must come into contact with such food-stuffs and their products as are less easily digested than the mother's milk to which they have hitherto been accustomed, and if the weaning has been carried out very suddenly or if, by chance, the composition or quality of the food differs too greatly from what is desirable, gastro-enteritis results. The intestinal inflammation connected with such *dietary disturbances* is sometimes catarrhal and more serious, but is never difficult to recognise and is easy to combat by changing the manner of feeding, or by ensuring the correct composition and quality of the food. It is superfluous to deal with these ailments derived from dietary faults in detail.

In this period, changes in the intestines may also occur in connection with *infectious diseases.* It is a known fact that gastro-enteritis may be one of the symptoms of a large number of infectious diseases such as erysipelas, swine fever, paratyphoid, etc. Such cases of gastro-enteritis must be judged from a standpoint entirely different from that of the disease restricted merely to the intestinal tract. The establishment of the causal agent enables a diagnosis of the true disease and in such cases treatment must not be directed primarily towards stopping the gastro-enteritis. Naturally, the form of protection is established by the nature of the infectious disease in question. I do not think that the discussion of cases of gastro-enteritis occurring in course of infectious diseases belongs to my report, especially as most of such infectious diseases are not confined to the young pig. But I must pay more attention to the gastro-enteritis which arises as a symptom of *paratyphoid* (salmonellosis), because (1) this disease is truly a disease of youth and (2) because in subacute or chronic forms of the disease, this particular gastro-enteritis is in the foreground of the pathological picture, and what is more, it sometimes happens that nothing but gastro-enteritis can be established.

Paratyphoid of the piglet, according to our investigation, is caused by the *Salmonella suipestifer.* Thus, in the past five years (1934-1939) we have had occasion to examine 525 carcases and have always demonstrated this micro-organism as the cause of the disease. So far as I know, in England also, this species of bacteria causes paratyphoid in piglets, as Mr. Lamont pointed out in his interesting lecture delivered at the Glasgow meeting last year.

Salmonella suipestifer is found throughout the intestinal contents of a certain proportion of healthy pigs. Therefore the disease could break out anywhere where the special conditions for an outbreak exist. For the *Salmonella suipestifer* to cause disease, it is necessary for the resistance of the young pigs to be reduced by some unfavourable circumstance. Causes of susceptibility, according to our experience, separately or collectively, are the following: Accommodation in wet sties where the air is too damp; food containing too little protein, or even more so, food containing too much protein; food containing insufficient calcium and phosphoric acid, or containing them but in incorrect proportion; food poor in vitamins; the complete lack or deficiency of pasture; tiring in travelling; worms; too great reaction following vaccinations, etc.

Recently, in Germany, Radtke expressed the opinion that susceptibility to paratyphoid was caused exclusively by infection with the virus of piglet influenza (enzoötic pneumonia; Ferkelgrippe). Piglet influenza and paratyphoid frequently occur simultaneously in the same animal but this is by no means always the case. For instance, we found catarrhal pneumonia in 347 (63·7 per cent.) of 525 pigs which had died of paratyphoid. Therefore, without desiring to cast doubt on the rôle of the virus of piglet influenza in causing a predisposition for paratyphoid, I cannot subscribe to Radtke's statement. In my opinion, the joint appearance of paratyphoid and piglet pneumonia is rather due to the fact that the same predisposing circumstances are to be found in the aetiology of both.

The above-mentioned unfavourable influences, according to our experiences, cause the necessary predisposition chiefly in two- to four-month-old piglets, the result of which is the development of paratyphoid. Older animals rarely suffer from paratyphoid. Susceptibility stops at the age of six months.

[I will mention here, by the way, that the increase of *Salmonella suipestifer* in the animals' tissues is rendered possible by the filterable virus of swine fever. Therefore, in pigs suffering from swine fever, *Salmonella suipestifer* is also able to cause pathological changes. On such grounds *Salmonella suipestifer* may cause disease in pigs over the age of six months. In this case, however, it is incorrect to speak of paratyphoid. The disease should be called the complication of swine fever caused by *Salmonella suipestifer*, the significance of which is quite different from that of paratyphoid, for the latter is a disease caused primarily by the *Salmonella suipestifer.*]

If *Salmonella suipestifer* is able to increase in a piglet whose resistance has been reduced, and to penetrate from the intestine into the tissues, we are confronted by two possibilities.

It is possible that the disease may appear in acute form. In this case the bacilli multiplying in the blood stream cause septicaemia in the course of which, besides the hyperplastic swelling of the lymph glands and of the spleen, there also occur fibrinous peritonitis and haemorhages in the various organs (kidneys) and especially gastro-enteritis. This pathological picture is not always easily distinguishable from swine fever; on the contrary, it seems that in practice it is very often mistaken for swine fever. But here I cannot bore you with the differential diagnosis referring thereto, for I feel that this question would exceed the limits of this lecture.

But I must consider the subacute and chronic form of paratyphoid in more detail. This form may occur either immediately after the above-mentioned acute forms, or may start as a subacute or chronic type. In such cases we find no haemorrhages, the spleen is normal and the pathological changes are nearly always restricted to the gastro-intestinal canal, chiefly the intestines. The most prominent symptom of this form of the disease is generally diarrhoea. First of all the piglet is pale and its bristles are dull, and diarrhoea soon appears, accompanied by the evacuation of a fluid excrement, yellow in colour and offensive in odour. The animals gradually deteriorate and generally die, though often only after several weeks of ill-health. Sometimes they recover, but if they do, they are generally underdeveloped and for the most part, profit little by their food.

Post-mortem examination shows two kinds of intestinal changes. There are cases where the epithelial layer of the mucous membrane in the small intestines, possibly in the colon too, undergoes necrosis diffusely in longer or shorter sections. When this happens the epithelial layer in the small intestines turns into a homogenous bran-like material. In the colon, the necrosed epithelial layers—if fibrin has become mixed with the same—give the impression of a homogenous caseous material. In progressive cases the bowels, owing to fibroid induration of the connective tissue, form a rigid tube. In other cases, however, the intestinal change has caused peculiar ulcers in the colon. The ulcers are formed from the caseation of the lymphoid follicles and their surroundings. The younger ulcers are shallow, their edges smooth, and a crumbly material may be scraped from their base. The decayed tissue, since, in most cases, fibrin does not mix with it, only slightly rises above the surrounding sound mucous membrane. The older ulcers, however, are surrounded by a smooth wall of mucous membrane originating from demarcational inflammation. As the ulcers heal, this wall-like ring becomes wider and wider towards the centre, and finally, if the animal does not die, the ulcers heal up by cicatrization.

This form of paratyphoid was formerly generally confused with swine fever because ulcers are also found in the colon in certain cases of swine fever. Errors in diagnosis are still frequent, although it is possible to distinguish between the two diseases if we consider the difference in the evolution of the ulcer-formation. We have seen that in paratyphoid the essential of the ulcer-formation is that the lymphoid follicle and its environment simply undergoes necrosis without any special excretion of fibrin, and demarcation begins around the ulcer. In swine fever also the ulcers in the colon commence with the necrosis of the lymphoid follicles. Here, however, the ulcer-formation is not caused by *Salmonella suipestifer* but by the filterable virus of swine fever. As the virus may also affect the walls of the blood vessels, a serous exudation issues into the necrosed tissues and fibrin is coagulated from the blood plasma. Therefore the ulcer is soon covered by a thick deposit (the so-called "button") which consists of a mass of necrosed tissue mixed with fibrin. As the excretion of fibrin does not occur all at once, but at intervals, the "button" is generally not homogenous but shows a concentric series of rings on the surface. This, as I have mentioned, is a sign that when the necrosis spreads concentrically towards the surrounding parts, repeated layers of fibrin are deposited on the already existing fibrin mass.

Therefore it is not difficult to distinguish between paratyphoidal and swine fever ulcers, even if no other anatomical changes or epidemiological facts are available for diagnosis. In cases of paratyphoid we find flat ulcers, in more advanced cases, with wall-like demarcation at the edge of the ulcer, while in the carcases of animals which have died of swine fever, the ulcers are covered by a thick deposit "button" showing a concentric appearance. In time, of course, the concentric appearance fades or disappears because the surface of the "button" becomes worn away. At this stage, we generally find the necrosed follicle or simply a shallow depression.

Treatment of paratyphoid is in general unsuccessful, but in cases where the cause of the disease can be traced to food deficient in vitamin, the subcutaneous injection of a preparation containing the lacking vitamin often helps. Many recommend the subcutaneous injection of immune serum against *Salmonella suipestifer*, but we, ourselves, have seen no good results from this process. Prophylaxis immediately on the appearance of the disease is much more important and successful. Prophylaxis, here also, just as with the disease of the new-born, consists in finding and eliminating

the cause of susceptibility. Besides this, the sick animals must be separated from the healthy, and the sty must be disinfected. Prevention of the outbreak of the disease consists in correctly regulating the maintenance and feeding of the animals, and we must use such protective measures of this kind all the more, as by vaccination it is impossible to immunise the animal against this disease. We must provide dry, temperately warm and well-ventilated sties. In damp sties we can often prevent the trouble if we cause the foundation walls to be insulated, a wooden boarding to be set up, a new flooring to be made of a heat-proof material, or a dense grating to be placed above the old floor or by heating the sty and by providing thick bedding. Besides all this, it is essential to keep the pigs in the open whenever possible. At last year's meeting of this Association, considerable attention was given to the significance of Waldmann's separate hut and run in the prevention of piglet pneumonia. I believe this system to be efficacious against paratyphoid also, as it ensures the pigs being kept in the open. Besides this, it is very important in prophylaxis against paratyphoid that the pregnant sows, as well as the piglets, should be correctly fed. A food should be provided which, besides being sufficient, but not excessive in protein and vitamins (especially vitamins A and D), should contain mineral compounds in suitable quantity and proportion. On the other hand, the custom, often met with in my country, of regularly disinfecting the sties even in absence of any kind of infectious disease, is superfluous, even harmful. For when disinfecting, much moisture occurs in the sty thereby increasing its humidity, in consequence of which, in imperfectly constructed sties, the possibility of catching cold as a cause of predisposition is thereby increased. I have experienced, in several cases, that the prohibition of such exaggerated disinfection put an end to the paratyphoid.

As we see even with regard to the prevention of paratyphoid we cannot work schematically. Here also the veterinary surgeon must investigate, sometimes in the manner of a detective, to find the fault in the given case of pig-keeping, and when he has found it he must put an end to it.

The diseases about which I have had the honour to say a few words, are not easily controlled, as their prophylaxis not only presupposes knowledge and aptitude on the part of the veterinary surgeon, but also depends on the extent to which the veterinary surgeon is able to persuade the breeder to improve and perfect the conditions of pig keeping and feeding. Thus, prophylaxis against the diseases in question, places a heavy task on the veterinary surgeon but this task is a grateful one in other respects, since in course of its execution he must, in general, lay special stress on hygiene. Recently we have heard much talk about the desire that the veterinary surgeon should primarily be an immuniser. To a certain extent this may be true, but I think that considering the present tendency of animal breeding we ought rather to express the wish that the veterinary surgeon, in the first place, should be an apostle of hygiene and preventive medicine in general.

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Discussion

Dr. Manninger's paper was discussed—to the great regret of the members in his unavoidable absence—at the first session to be held in the Town Hall, Great Yarmouth, on the morning of Wednesday, July 26th, 1939.

In the absence of Dr. W. H. Andrews, Professor T. Dalling presided, there being a large attendance.

Professor Dalling explained that his presence in the Chair was due to the absence of the Chairman of the session, Dr. W. H. Andrews, who had had to go to America to attend another congress. He explained, further, that he had to make an apology for the absence of Professor Manninger, Budapest, who was unable to be present at the meeting and to take part in the discussion of the subject now before them. Professor Manninger had accepted the invitation to prepare the opening paper, and it had been his full intention to be present at the discussion but unfortunately he had become ill and was therefore unable to travel from Hungary. He sent his sincere apologies but he undertook to read the remarks made by the various speakers and to write replies to points brought up in the discussion. (Professor Manninger's replies will be published in the *Véterinary Record* in due course.)

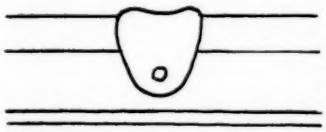
Professor Manninger had asked the Chairman to introduce the paper. The Chairman explained that this was really unnecessary for the paper had been circulated to all members and no doubt the delegates were familiar with its contents. Professor Manninger had sent to the Chairman four drawings (coloured in the original) illustrating the formation of ulcers in the intestine of pigs infected with paratyphoid and swine fever, respectively. The drawings were exhibited (see page 1165) and the Chairman pointed out the salient features of the ulcers which Professor Manninger wished to stress.

The Chairman now called upon Mr. J. O. Powley to open the discussion.

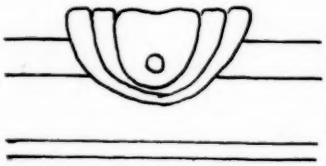
Mr. J. O. Powley, M.R.C.V.S. (Ministry of Agriculture): In the first place I would like to express my pleasure at the honour and privilege accorded me on being asked to open the discussion on a paper of this nature by such an

R. MANNINGER: FORMATION OF ULCERS

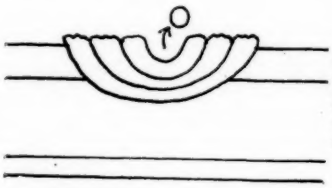
Schematic Section of the Colon
Evolution of the ulcer in Swine Fever



Necrosis of the lymphoid follicle and its neighbourhood; the necrosed tissue mixed with fibrin.

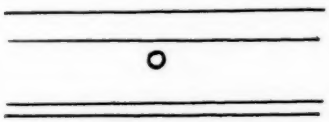


"Button"formation; concentric appearance in consequence of several layers of fibrin periodically coagulated.

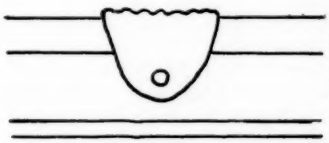


The surface of the button eroded; the follicle becomes visible and even detached.

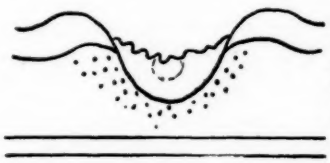
Schematic Section of the Colon
Evolution of the Ulcer in Paratyphoid



Normal intestine.

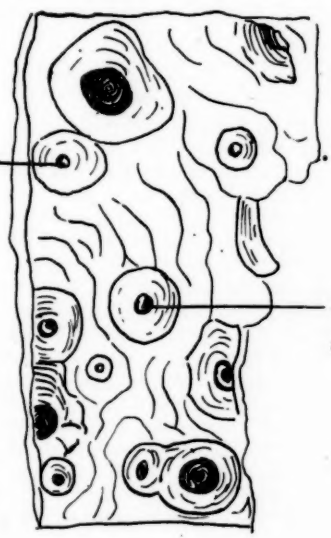


Necrosis of the lymphoid follicle and its surroundings; no coagulation of fibrin

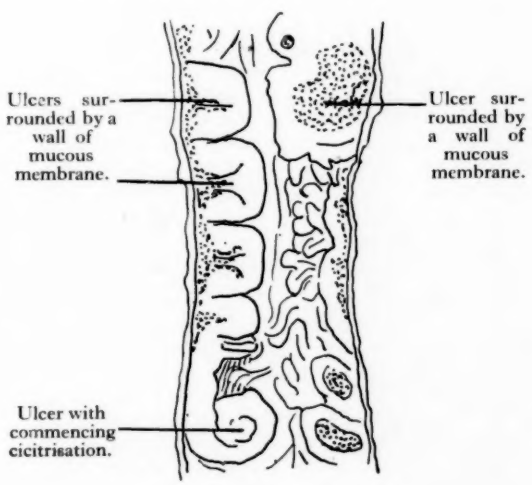


The necrosed tissue partly disappeared; the ulcer surrounded by a wall of mucous membrane owing to the demarcational inflammation.

Swine Fever: Button formations in the Colon



Paratyphoid: Typical Ulcers in the Colon


Ulcers surrounded by a wall of mucous membrane.
Ulcer surrounded by a wall of mucous membrane.
Ulcer with commencing cicitrisation.

eminent Continental authority as Dr. Manninger, at the same time expressing our thanks to him for placing such an adequate survey of the facts in such a small compass.

The subject under review this morning is one of great economic importance to the pig industry, not only to these islands but to all countries where pig rearing is carried on to any extent. It is a somewhat involved problem and there is no simple or single method of attack which shows the solution.

During the last 35 years the outlook on digestive disturbances of young pigs has undergone considerable changes; whereas swine fever and worm infestations used to be considered the "be all and end all" of pig practice, to-day, as pointed out by Dr. Manninger, pig rearing has developed along intensive lines with the concomitant evils of overcrowding, faulty housing and artificial forcing.

In the course of his essay Dr. Manninger on several occasions refers to vitamin deficiencies and it is this factor I wish to stress particularly this morning, as I am convinced vitamin deficiencies are factors making for many of our present-day troubles in pig rearing, many of them being possible of elimination to a greater or lesser extent.

It is becoming generally recognised that the litters of pigs bred indoors through several generations sooner or later develop anaemia and that pigs bred outdoors show better live weight gain. Further, indoor farrowed pigs, in many cases, when turned out at three weeks old do not, as a rule, make such good growth as outdoor farrowed pigs. These are points brought to our notice by the industry and require an explanation, as explanation there must be.

As a matter of interest and one which has some bearing on our present discussion, pneumonia is stated to be more prevalent in litters born on concrete than on earth or dirt floors, always realising that the so-called piglet influenza may in some cases predispose to infections with the facultative pathogenic bacteria enumerated by Dr. Manninger.

Workers at the Reading Institute of Dairying have, during recent years, carried out pig feeding experiments which throw considerable light on some of our pig disease problems. Feeding a ration which appeared balanced in every way as regards proteins, carbohydrates and minerals, with which even the most meticulous could not find fault and with litters bred indoors, they found that lack of vitamin A was the prime factor making for disease in both bacon pigs and suckers.

As regards vitamin D it is now generally thought that where the diet is adequate in calcium and phosphorus content very little vitamin D is required in the pig's economy.

We are all now more or less conversant with nutritional anaemia which demonstrates itself in litters by the pallid appearance of the skins of the sucking pigs and the white scour appearing, as a rule, at about the third week of life, leading on to general unthriftiness and in many cases, necrotic enteritis if not tackled with iron therapy the moment the trouble is manifested.

To me the appearance of this nutritional anaemia in a breeding establishment is a danger signal, warning me that there is something radically wrong with the system of management, necessitating, as a rule, drastic rearrangement of the rearing methods. We all know that in these cases if we switch over to the outdoor system of rearing our troubles are considerably curtailed and, in some cases, almost entirely eliminated. In one piggery I know where the outdoor system of rearing was adopted owing to the enormous losses from digestive and other troubles in the young pigs, the disease problems were not entirely overcome until the litters were left out of doors until 14 weeks old. If litters are penned before 14 weeks of age a certain percentage develop digestive troubles.

Some years ago at a meeting of this Association at Llandudno I made the statement that necrotic enteritis was essentially a disease of bad housing, overcrowding and fancy methods of pig rearing, meaning by fancy methods those intensive systems where sows and their progeny are penned up for the whole term of their lives away from nature and the sows expected to produce healthy young.

We have all heard of the man who goes in for pig rearing on the Danish system as it is applied in this country and feeds entirely on a so-called balanced ration. For a year or so matters progress satisfactorily and then digestive troubles begin to appear in the young pigs, the troubles becoming progressively worse with each succeeding litter until the unfortunate owner can continue no longer.

Is not one explanation of these losses the lack of vitamin reserves in the livers of the young pigs? The vitamin reserves of the dams after a year or two penned in sties away from nature must, in many cases, be reduced to an absolute minimum with the result that the young pigs are expected to thrive without one of the most vital elements essential to life, *viz.*, vitamin A, that curious substance which exerts such an influence on the various mucous surfaces of the body, giving the animal economy the powers necessary to resist the attacks of the various facultative pathogenic bacteria referred to by Dr. Manninger. The dams, in all probability, have sufficient liver reserve of vitamin A to maintain themselves in good bodily health, but not sufficient to transmit to their offspring for protective purposes. In this connection there would appear

room for research as to how the lack of the essential vitamins A and D affects the economy of the young pig in its power to assimilate iron because, in my experience, the history of nutritional anaemia is also one of the withholding of the essential vitamins.

There is a trite Continental proverb which states "He who has to do with women and pigs finds himself in great turmoil." It is a comparison both ungallant and absurd, but referring now to the porcine species the turmoil is due to our lack of understanding of some of the vital factors so necessary to animal health. The solution of these porcine digestive troubles lies in prevention and not in the cure of the various disease conditions once our mismanagement has produced them.

Having pointed out the needs of the young pig for the essential vitamins one naturally looks for a readily available source of supply easily administered.

Pigs can satisfy their need for vitamin A either from plant or animal sources, the available source in plants being in the form of carotene, a substance which can be converted in the animal body, probably through the liver, into vitamin A.

Supplementary foods such as ensilage, yellow whole maize, dried grass and dried whole milk contain vitamin A, and one of the most readily available sources of both A and D fed as a supplementary is a good grade cod liver oil.

I agree with Dr. Manninger that immunisation methods are of very doubtful value once some of the disease processes are established in a herd. Attention to diet, hygiene, proper housing and management are the factors which will make for success in that if properly carried out it should not be possible for many of the troubles to arise.

In the limited time at my disposal no attempt has been made to discuss differential diagnosis or the rôles of the various bacteria incriminated in producing the disease processes, as other speakers who follow will doubtless have something to say on these matters.

With reference to *suipestifer* infection I would like to point out that so long ago as 1897 the Swine Fever Scientific Committee, working with the *Bacillus cholerae suis*—which organism, in the light of our present knowledge, is probably identical with the *Salmonella suipestifer*—produced bacillary necrosis of the bowel in swine by inoculation, cohabitation and feeding, the disease induced being indistinguishable from our present-day paratyphoid or so-called *suipestifer* infection. In connection with the use of cod liver oil as a supplementary feed, there are records of losses from severe intoxication, probably attributable to the unsaponifiable portions of the oil. With the present-day high-grade oils the feeding of cod liver oil in the requisite small dosage is attended with absolutely no risk.

Before concluding, I would like to state that I have not encountered brucellosis in this country as a factor producing dysentery in young pigs.

Professor W. Kearney, M.R.C.V.S. (Veterinary College of Ireland), who was the second opener of the discussion, said: I think the Organising Committee are to be congratulated on getting such a well-known authority as Professor Manninger to contribute to this Congress. His international reputation on swine diseases is ample guarantee of the high value and importance of his observations on the subject-matter before this meeting. It is unfortunate, however, that he is unable to be present to answer questions that arise in the course of this discussion.

Professor Manninger has placed before us a complex subject in a concise and instructive manner. The subject is complex because of the variety of causes of alimentary changes in the pig and because of the divergence of views regarding the significance of certain of the alleged causes. It is obvious from Professor Manninger's paper that there is still some confusion in this latter respect although his researches have helped to clarify the position considerably. It is not to be wondered at, however, that confusion still exists on the aetiological factors of certain lesions in the gastro-intestinal tract of pigs, in view of the variation of circumstances associated with pig husbandry in different parts of the world. Most authorities are now agreed that in the absence of specific infections and poisonous substances ingested by young pigs, gastro-enteritis can be attributed, indirectly, if not directly, to certain food factors and other environmental influences. Outside the occurrence of digestive disturbances attributable to such causes under natural circumstances as instanced by Professor Manninger, observations have been recorded by various investigators of the artificial production of gastro-enteritis by food deficient in vitamins. I shall refer only to two of these observations, namely, that by Foot, Golding and Kon at the Dairy Institute, Reading, last year, in which they record *inter alia* that a diet deficient in vitamin A caused an acute catarrhal inflammation of the stomach and intestines of young pigs, and that by Sheehy of the Albert Agricultural College, Dublin, in 1930, in which, amongst other findings, enteritis was observed in pigs deprived of direct sunlight (vitamin D deficiency), whereas control pigs on the same diet but exposed to sunlight did not develop this intestinal lesion. It is reasonable to assume, I think, from the knowledge now available, that deficiency in vitamin A, and to a less extent perhaps of vitamin D,

brings about inflammatory changes of a catarrhal nature in the alimentary mucous membrane and such deficiency may well be a common causal factor of gastro-enteritis in young pigs reared under unnatural circumstances on food poor in these vitamins. In Southern Ireland, where pig rearing is an important industry, we seldom encounter this form of gastro-enteritis in piglets; a fact which bears out this contention, because sows with young, and piglets after weaning, are allowed daily access to green pastures and receive a considerable quantity of milk and fresh food grown on the farms.

Professor Manninger's observations on salmonella infection of older pigs are of great importance in that they show that such predisposing influences as unhygienic sties, unsuitable diet and other factors are materially concerned with the development of the disease, but Shanks' and Lamont's observations, as published in the *Veterinary Record* of February 26th, 1939, show that the disease having once become established in a sty is capable of continuing in a herd of pigs despite the adoption of stringent sanitation and good feeding. It is difficult not to believe that virulence of the organism is enhanced by passage in such cases. In certain areas in Southern Ireland the diphtheritic form of salmonellosis occurs under circumstances which strongly suggest high virulence of the organism leading to actual outbreaks involving several farms in a neighbourhood.

My experience does not support the view of Radtke and others that the virus of piglet influenza necessarily predisposes to salmonella disease. In a large farm under our observation where influenza has been rife for some years, no cases of salmonella infection have been detected, nor have we observed it in our experimental pigs in which the virus disease had been maintained by artificial passage.

The part of Professor Manninger's paper which has the greatest practical interest for us is that which refers to the responsibility of swine fever virus for ulcer formation in the intestines and the diagnosis of the chronic form of that disease by the appearance of those ulcers. I have but little practical experience of this aspect of the subject but as a teacher of Veterinary Pathology I am much interested in the matter. Up to now I have considered that the virus of swine fever sets up septicaemic-like changes which may end in death quickly or be followed by the activity of bacteria, principally *Salmonella suipestifer*, which cause ulcerative enteritis but that such ulcers may occur occasionally without the attack of virus. From Professor Manninger we have now got a definite expression of opinion that the virus, *per se*, causes those concentric button ulcers which, to use his own words, are not difficult to distinguish from those caused by Salmonellae. I have also been told by experienced observers in Ireland that there is little difficulty in diagnosing swine fever from the appearance of these ulcers. Furthermore, I understand that since the eradication of swine fever from Southern Ireland these ulcers have not been encountered. Are we then to accept these ulcers in future as unquestionable evidence of swine fever? For my part I find it very difficult to agree with the view that these ulcers are formed by the sole influence of the virus, nor am I satisfied on histological grounds that the changes enumerated by Professor Manninger are capable of differentiation from those caused by *Salmonella suipestifer*.

Mr. G. S. Muir, B.V.Sc., M.R.C.V.S. (Needham Market, Suffolk), made the third "opening" contribution, in the following terms: I feel that we owe an especial debt of gratitude to Professor Manninger for his paper, upon such a difficult problem as the Diseases of the Digestive System of Young Pigs. It is a subject with which many of us are brought into contact almost daily; it remains a very serious problem, and anything that will assist us to a correct diagnosis and preventive treatment will be welcomed by all who have to deal with country practice.

I entirely agree with Professor Manninger that disease in young pigs is almost always brought about by circumstances causing a state of increased susceptibility of the pig, thus allowing some of the bacteria among which that animal normally lives to get the upper hand. I will refer to these circumstances in short as "deficiency." Therefore nearly all the diseases of the digestive system of young pigs are due primarily to a deficiency; it may be a deficiency in the diet of the sow, lack of vitamins, especially prevalent in winter among sows housed continuously and denied access to pasture, so that pigs born, say, in February, and weaned in March or April have never, whether *in utero* or during the suckling period, been allowed a sufficiency of vitamins and probably also suffer from a coincident lack of minerals, with the result that at the time of weaning these pigs fall an easy prey to intestinal disease.

Deficiency of essential elements in the food, badly balanced rations, lacking sufficient protein, minerals and vitamins—such as an excess of flaked maize—constitute a potent cause of trouble.

Anaemia, deficiency of iron, is a well-known cause of mortality and lowered resistance. Deficiency of sunlight and of green food is a common enough occurrence, so much so that we are almost surprised to see how wonderfully well pigs develop when they and the sows have free access to large pastures, and live in the

open air. In my opinion, this question of deficiency of various essential elements in the food and environment of young pigs is of such paramount importance that it cannot be emphasised too much and the greatest contribution that we as a profession can make to the pig industry is to preach continuously and vehemently, with as loud a voice as we can, the common-sense doctrine that pigs, like any other young growing animals, need a sufficiency of all the food elements, plus sunshine, fresh air, and exercise, in order to be able to develop healthy bodies and resist disease. This is an educational campaign of the first magnitude and must be pursued by every one of us who has to deal with pigs, if we are to gain any enduring measure of success and thereby bring lasting credit to our profession. Vaccine or serum treatment may be brought to a stage of usefulness, but so far the use of these agents has been disappointing, and they are false gods: *prevention must be the aim*, then treatment will be unnecessary.

Of course definite infectious diseases may appear in otherwise healthy herds, but these cases are more rare; I have never met with brucellosis among sows, but this disease should be borne in mind when dealing with large breeding herds and we are indebted to Professor Manninger for referring to it.

Ventilation of sties is another matter of very great importance. Pigs must have a warm dry bed, the sty must be kept at as even a temperature as possible, free from draughts but with sufficient fresh air fo prevent an undue concentration of CO_2 at ground level; the type of house allowing a high day temperature and a low night temperature is bad—partitions and roofs which may be lowered or raised as required, or some such arrangement, may do much in this regard.

I cannot pass over the subject of paratyphoid without referring to the outstanding contribution to our knowledge made by Messrs. Shanks and Lamont, to whom we should all be grateful for their recent publications on the subject. I must, however, join issue with Professor Manninger on his statement that the ulcers of paratyphoid and swine fever are not difficult to distinguish. In definite and typical cases, of course, they are not difficult to differentiate, but in many cases ulcers apparently typical of swine fever do occur, when, in fact, only paratyphoid exists, and these two diseases do cause almost incredible difficulties in diagnosis in some cases; in these cases, in coming to a decision, the epidemiology is more important than the pathology. In my opinion paratyphoid is always secondary to some other disease, such as influenza, swine fever, deficiency of vital elements, or worms.

The fourth opener of the discussion was Mr. F. L. Gooch, F.R.C.V.S., of Stamford, Lincs., who said: I must first thank Dr. Manninger for his excellent paper: you might expect, from his position in the profession, that he would look at the diseases mentioned in the paper from the viewpoint of a research worker and not from that of a clinician.

Several deductions may be arrived at from a study of the paper, but I will mention only two, *viz.*, that Dr. Manninger has had very little success in the treatment by vaccines or serums, or immunisation, but that he has seen much better results after improved dietetic measures and keeping the pigs under more hygienic conditions; finally he expressed his belief that the best results are obtained by outdoor living. It will be also necessary to combat those organisms that are in the animal's body and which act more or less as a cause predisposing to an attack of the disease. I fully agree with Dr. Manninger as regards outdoor living. I have several large breeders in my practice, and I will mention one where the owner converted some old farm kennels into pig sties, but without sufficient light and air; two years ago he was persuaded to try the outdoor method and now all his sows are tethered in the grass field with collars round their necks, with much better results except for the condition of the grass field.

There are two diseases in young pigs, not mentioned in the paper, of which I would like to speak, *viz.*, infection by round worms and salt poisoning. The first causes considerable mortality in young pigs and leaves them very unthrifty. In reference to the second, housewives used to put the butter milk into the refuse tub and during the summer months more salt was used as a preservative; this was mixed with the young pigs' food and often produced fatal results; also many pigs are killed by being fed from the refuse tubs of aerodromes and other camps, particularly when the tub is emptied and the contents at the bottom are mixed with the food.

There is yet another way in which we may get salt poisoning and although this does not come within the purview of the paper, as it applies more to fattening pigs, yet I think it is worth mentioning from a legal aspect. Most pigs now are fed on balanced rations and these rations contain a quantity of fish meal. This fish meal is obtained from cargoes of fish (mostly herrings) that when landed were found to be unfit for human food, and when the hull of the trawler is emptied a large quantity of salt will be found at the bottom, and this, if not properly distributed over the whole cargo, is found in some of the rations in poisonous quantities.

The question I want to ask is this: "Can a purchaser who loses pigs from salt poisoning when feeding on balanced rations, recover from the vendors the amount of his losses?"

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General Discussion

Mr. K. D. Downham (Newport, Shropshire) said that his few remarks would be concerned particularly with the influence of different methods of swine husbandry upon the diseases of young pigs.

Many people had widely stressed the importance of vitamin A for these animals. Recently he had conducted a small experiment on pigs and would give the results to date. Twelve pigs were purchased from a reputable pedigree breeder. Six were nine months old and had been mated a few weeks, the other six were seven months and were unmated gilts. All the gilts had been reared indoors under good conditions. After purchase the twelve pigs were put out in the open on some rough derelict pasture land and allowed to root. The six young sows which were in pig when purchased produced very poor litters with a high mortality and at weaning only four pigs were alive.

The other six sows produced an average of ten healthy pigs at weaning and he was quite sure that the supply not only of vitamin A but of vitamin E was of great importance in the breeding and rearing of pigs. One sow they had purchased previously to this experimental work had her first litter and produced ten pigs, four of which they reared. She was then put out to pasture and her second litter was twelve, of which eleven were reared, and her third litter, which she had just produced, numbered 20 and, when he came away, there were 18 alive. He thought that experience indicated the very great importance that methods of management of pigs, and of breeding sows particularly, had on fertility, and breeding losses in young pigs. In his opinion, after weaning young pigs suffered not only from Salmonella infections, but often from coliform infections, and he thought massive doses of these organisms were ingested through young pigs putting their feet into the troughs when feeding.

Recently he had added brilliant green to the swill,* and there had been a great improvement as far as he could see.

He was of the opinion that most of the diseases of young pigs were the result of bad husbandry methods. The practice of using cheap electrified wire was a great help because one could move it so easily and prevent not only bacteriological but parasitic diseases by providing frequent change to clean grass runs for the pigs.

Mr. H. G. Lamont (Stormont, Belfast), observed that, like other speakers, he deplored the fact that illness had prevented Dr. Manninger from attending the meeting. He thought that the Provisional Committee should be congratulated on having secured the services of such a noted investigator as Dr. Manninger.

The first note he had made was in regard to the presence of brucellosis in the sow as a cause of digestive disturbance in young pigs. So far, although they had investigated a considerable number of cases of abortion occurring in sows in Northern Ireland, they had not encountered evidence of infection with *Br. abortus* as indicated by the agglutination test. In connection with abortion he might observe, in passing, that they had had a series of cases of abortion occurring in sows ranging in a wood and that where sows had reached term mummification of the foetuses had occurred. The trouble stopped when the sows were removed from the wood. It was felt that eating the roots or herbage of some poisonous plant, possibly the common foxglove, which was growing in profusion, had been responsible for the cases. Previous speakers had emphasised, and in his opinion rightly so, the importance of proper management of the sow. In Northern Ireland they did not have very serious loss from digestive troubles in young sucking pigs and the explanation might lie in their system of management. In his opinion diarrhoea as a symptom occurred in piglet influenza and in lactational anaemia. He would like to ask Dr. Manninger what significance he attached to the haemorrhages which occurred in swine fever infection in the intestinal mucous membrane. Was it not possible that these haemorrhages served in many instances as the starting point of the swine fever ulcer? Again, did Dr. Manninger attach any importance to *Balantidium coli* infections? This organism was common in pigs in Northern Ireland, and often occurred in immense numbers in cases of necrotic enteritis.

In his experience rearing on grass had a most beneficial effect in controlling paratyphoid. On farms where paratyphoid had been a problem, open air grassland rearing or the German hut system of rearing had eliminated this disease.

One point that he would like to make was that nutritional experts should seek the co-operation of veterinary surgeons when running their experiments. On a recent trip abroad he had visited a nutritional centre and was amazed to find obviously diseased pigs included in the experimental group. The officer in charge had informed him that it was almost impossible to set up an experiment without including pigs affected with pneumonia. In his opinion one could not draw accurate conclusions if working with diseased pigs and he urged that every nutritional centre should be supervised by a veterinary surgeon.

No mention had been made of a condition which they had reported in Northern Ireland. It occurred principally in pigs 11 to 14 weeks old and was characterised by sudden death or the sudden onset of paralysis followed by death. In many instances *post-mortem* findings were negative, but oedema of the stomach wall, intestinal wall and mesentery and of the spinal cord had been recorded. The history of a change in the system of feeding was fairly constant, *e.g.*, a litter of pigs bought by a fattener from a smallholder who had reared it on slop, and then put it on dry feeders was often affected, and as Northern Ireland was a country of smallholders the disease was of economic importance to them. Prompt treatment with purgative doses of magnesium sulphate and feeding on bran mashes for two or three days prevented the development of cases and resulted in recovery if affected pigs were purged out promptly.

Mr. Downham had omitted to mention the concentration of brilliant green used; many of those listening would like more specific information on this point.

Reference had been made to losses from stomach worm infection. Unfortunately, they had had similar losses from this worm in

*Note.—The brilliant green was fed in the dilution of one in ten thousand.

Northern Ireland. Rearing on confined paddocks might result in a spread of stomach worm infection.

Dr. W. P. Blount said that on the question of coccidiosis he could assure Professor Kearney that a course of vitamin A did not prevent that disease. Continuing, Dr. Blount asked was it not a fact that there was a good deal of salt in fish meal? In some cases as much as 10 per cent. of this product was fed to the pigs, but there should be no question of salt poisoning in pigs provided the source of the fish meal was a good one. Was it not a fact that there were many pig farmers using rations markedly deficient in vitamin A and vitamin D? There must be many pig breeders who used no other meal than middlings; in other words, he felt that the nutritional side was being exploited against the known facts. For those who were anxious to supply vitamin A to pigs, instead of using the ordinary cod liver oil, there were now available several fish meal concentrates which were said to contain half-a-million units per gramme instead of 1,000 units; in other words, one could now give one capsule of vitamin A concentrate to a pig which would last throughout its life. Other people were putting cod liver oil in the form of an emulsion to which was added calcium and iron.

Mr. N. S. Barron said that perhaps vitamin A deficiency was more common in the pig than in other animals and therefore assumed considerable importance. In its absence very characteristic symptoms developed.

With regard to *post-mortem* work carried out by agricultural institutes, he would like to say that he (the speaker) was responsible for the *post-mortem* work in connection with the work being carried out at Shinfield, Reading, and was very pleased to co-operate with them on all occasions. Further, in connection with vitamin A it was a remarkable fact that in its absence it was possible to infect pigs with the human *Ascaris*. The human ascarid and the pig ascarid were identical morphologically, but if you put a pig on a vitamin A deficiency ration you could infect it with the human species. He had observed that in pigs with heavy *Ascaris* infestation no vitamin A was present in the liver. The explanation was not yet clear; it was possible that the ration was deficient in vitamin A and therefore the pigs became more readily infected; or did infestation reduce the A reserve? It did look as though there was in many diseases a lowering of the vitamin A content, and it was not quite certain whether it was the presence of the disease that produced absorption of vitamin A, or whether a reduction of the normal quantity of vitamin A caused a greater susceptibility to disease.

The Chairman, in intimating that the time had now come to terminate the discussion, said that they hoped that Professor Manninger would read all those remarks when the discussion came to be published in the *Veterinary Record* and would favour that journal with his observations for publication at a later date. (Hear, hear.)

At the Scottish Zoological Park at Edinburgh the staff have been busy for some weeks on wartime precautions. To guard against even the very remote chance that animals which might be dangerous to the public might escape during an air raid armed keepers are on duty all the time. All snakes which might have been dangerous have been killed.

The Veterinary Record

September 23rd, 1939.

Disease and the Young Pig

IT is with considerable reluctance that we find ourselves being forced ever more surely to accept the retirement of that splendid animal the horse, to a place of less and less significance in the scheme of the nation's economy, and to acknowledge the growing importance of animals whose prominence from the point of view of food production grows greater almost daily.

Not only has the cow asserted herself beyond all expectation and the sheep stamped its foot imperiously to attract attention but the lowly swine is now elevated to the position of a veritable image amongst us.

It can be fairly claimed that research is keeping pace with cattle diseases and in consequence our position as clinicians is not unenviable. The last decade has also seen tremendous strides in our knowledge of the maladies of sheep, but, with regard to the porcine species, although much good work has already been done, it yet remains to be correlated and there are still many blank pages in our book, The Story of the Pig.

Hitherto our interest has been held by conditions affecting the adult and all too little attention paid to pathological conditions of the young up to and shortly after weaning.

Reference to the discussion on Professor Manninger's paper, published in this issue, makes it plain that many have already accepted the dictum that bad management is the underlying cause of most piglet ailments. Intensified husbandry has caught the pig in its competitive net no less than other domestic animals and it was to be expected that the process of adaptation would bring its difficulties along with it. Anaemia, probably the best-known affliction of young pigs, is pre-eminently a disease of bad husbandry and when floors are wet and cold or ventilation defective, how often do scours, cramps, influenza and necrotic enteritis supervene.

That farmers, too, are becoming conscious of the paramount importance of management is shown by an increasing revulsion against old methods and the growing popularity of outdoor systems involving the use of fold units and pens, the tethering of sows and the employment of electrically charged fencing.

If we as veterinarians are prepared to accept the fundamental importance of management in its relationship to diseases of the young pig we shall have already started along the path of understanding, and if practice and research will but go hand in hand we shall, at no distant time, have added very appreciably to that store of knowledge which to date is well worthy of remark.

SOIL EROSION OVERSEAS

Typical of the many interesting articles in the September issue of *World Digest* is one entitled "Dust Bowls of the Empire." This is a vivid account of the price which is being paid to-day for the way in which the wheat growers of the nineteenth century produced their crops. They were rarely farmers in any real sense of the world—they were simply miners of whatever fertility had been accumulated throughout the ages in the virgin soils.

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Some time ago the serious problem of soil erosion in Kenya was examined by one of South Africa's leading experts, Dr. Pole Evans. He made a number of important recommendations, including the more intensive development of giant Star Grass to bind the soil, and to show what could be done he took a sample of this grass from East Africa and planted it under almost identical conditions near Pretoria. The results are sensational. One of the plants has reached a length of over fifty feet, and he is fully justified in his observation that this proof of Kenya's enormous potentialities would impress the entire world. Writing to Kenya on his return to South Africa, he says: "Since I have returned and had these grasses planted out at our Pretoria Pasture Station they have given astonishing results and leave no doubt whatever that you have the finest grasses in the world for combating soil erosion. The grass illustrated, after five-and-a-half months from planting one small plant, has made such growth that it has covered over 8,000 square feet of ground and a number of these plants have given shoots or single runners from the parent plant measuring over 50 feet in length. A shoot 50 ft. 3 in. long is being exhibited at the Royal Agricultural Show, Maritzburg, Natal. A single plant of this strain after being planted out, covered 1,168 square feet within two-and-a-half months. It was cut for fodder at the end of three months and yielded 229 lb. of hay."—*Scottish Farmer.*

CLINICAL COMMUNICATION

Milk Fever in an Aged Cow

D. N. O'NEILL, M.R.C.V.S.
NEWRY

The subject of this clinical note is a dairy Shorthorn cow, and she was attacked by milk fever for the first time at the age of 25, 24 hours after giving birth to twin calves. Including these latter she had given birth in all to 25 live healthy calves since her first parturition at the age of three years.

The attack of milk fever yielded within a few hours to udder inflation and the hypodermic administration of strychnine, and the cow recovered.

A first attack of milk fever in so aged a cow with such a breeding record must surely be unique.

ABSTRACTS

[Foot-and-Mouth Disease in Man. (Trans. title.) MAGNUSSON, H. (1939.) *Skand. VetTidskr.* **29.** 152-180. (English summary.).]

The histories of eleven suspected cases of foot-and-mouth disease infection in man are given.

All the cases occurred in personnel employed on farms where the disease was present in the stock at the time of their infection. The course of the disease was short and of a mild nature. Vesicles occurred in all cases on the hands or feet and in one case the mouth was affected and a finger nail shed. A sore throat was a usual accompanying symptom.

Virus, homologous in type to that of the infected stock, was demonstrated in the lesions, and specific antibodies in the blood, of four of the cases. In four others, only the specific antibodies were demonstrated. In the remaining three cases typical symptoms are the only evidence.

Attempts to transmit the disease by scarification from two of the cases in which virus was found, to three persons, failed. H. H. S.

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[Treatment of Brucella melitensis Infection with Prontosil. DEBONO, J. E. (1939.) *Brit. Med. J.* Feb., 1939. 326-327.]

Published reports on the specific effects of the sulphonamides in undulant fever led the author to investigate this line of treatment in melitensis infection in Malta. Twenty-five cases, comprising the three common types, were treated daily with 4·5 grammes of prontosil (in 18 cases prontosil rubrum, in four prontosil album and in three streptocide). In five cases the drug had to be stopped on account of

intolerance. In 19 cases no beneficial effects were apparent. Six cases are given individual consideration on account of the apparent recovery which followed the administration of the drug. In two of these severe relapses occurred (one fatal), one case was very mild, in one a very small amount of the drug had been given, and in the two remaining cases there was recovery in the eighth and seventeenth week respectively. These cases are quoted to illustrate the danger in accepting so-called "cures" in a disease of this nature.

In his discussion the author stresses the point that spontaneous recovery after six weeks is common in undulant fever and on that account the difficulty of assessing the value of any treatment is great. The dangers associated with the administration of prontosil, *e.g.*, severe headache, pains in the legs, vomition, cyanosis and dyspnoea and even severe haemolytic anaemia, were encountered in this series. In the septicaemic type of the disease the condition appeared to be aggravated by the administration of the drug. While there was no apparent effect on the agglutination titre or the white corpuscles an impression was gained that in some way the prontosil had interfered with the development of a natural immunity.

In conclusion the author states that in none of his cases was there a recovery which could be attributed to the use of prontosil and he is of the opinion that there is no justification for the use of this drug in Malta fever. A. T.

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[Avian Brucellosis. (Trans. title.) Pavlov, P. (1938.) *Rec. Méd. vét.* **114.** 790-798.]

Brucella infection of man and domestic animals has been widely studied throughout the world whereas the study of brucellosis in birds has been almost neglected.

Brucellosis was known to exist in France and Italy in 1907. In 1910, Dubois in France recorded an epizoötic in hens with a heavy mortality which he considered to be due to *Br. melitensis* of ovine origin, while more recently the disease has been shown to exist in America in farm fowls.

Other workers have shown that the injection or ingestion of brucella in poultry gives rise to a marked agglutination response which is long lasting; the bacilli are rapidly eliminated and whilst chickens were relatively resistant, it was not possible to infect through the egg. There may or may not be any pathological changes (enlargement of the liver and a few necrotic areas in the spleen being the only common lesions). Different authors disagree on the susceptibility of the pigeon to artificial infection.

The author details experiments carried out by injecting hens and pigeons with culture, the examination of eggs from the infected hens and the injection of "clean" eggs to determine the length of survival of the organisms. Pavlov found that it appeared that poultry were much more difficult to infect than mammals by both natural and artificial routes; that diagnosis can be made by agglutination test and by an allergic reaction; that in injected birds the titre reaches its maximum in one month, agglutinins disappear from the blood at the end of two months, whilst the allergic reaction is positive after three months; that eggs, artificially infected, contain living bacilli for from 4 to 14 days after injection, and that poultry are more susceptible than pigeons but do not shown any clinical symptoms. J. S. P.

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[The Toxicity of Br. abortus for Mice. Priestley, F. W., and McEwen, A. D. (1938.) *J. comp. Path.* **51.** 282. (7 tables. 11 refs.).]

It has long been known that the intraperitoneal injection of large numbers of *Brucella* organisms causes rats or mice to die from toxaemia in 1 to 4 days. The authors show that there is a direct relationship between the virulence of *Br. abortus* as judged by their ability to infect guinea-pigs, and their toxicity for mice. It is also shown that immune sera prepared in rabbits by the injection of living or dead vaccines is capable of protecting mice against the toxic effects of virulent or avirulent smooth strains, but not against rough strains. It is suggested that the toxicity test might prove a rapid, inexpensive means of estimating virulence but it is a matter of speculation whether or not fine degrees of virulence could be detected without using abnormally large numbers of mice. J. S. P.

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[Spastic Paresis of the Hind Limbs in Cattle. Rosenberger, G. (1939.) *Deuts. tierärztl. Wschr.* 2.]

An interesting illustrated description of a disability in Friesian cattle. Goetze reported the same thing in new-born calves in 1932 and the author believes that the disease may also occur in beasts above two years of age as a delayed syndrome. Affected cattle hold one or both hind limbs very straight, so that the hock is straightened out and resists sudden attempts to flex it, as if affected with tetany. On palpation the gastrocnemius and sometimes other muscles are found to be contracted. Four cases in one herd are described—one bull and three cows. Three were slaughtered and the fourth was submitted to an experimental tenotomy of the gastrocnemius tendon and partial tenotomy of the superficial flexor tendon, both just above the hock. This animal improved but continued to have a somewhat stilted gait.

Herd book evidence gave indications that the condition was inherited. J. E.

[**The Comparative Feeding Values of Grass when fed Green, as Silage or Hay.** French, M. H. (1937.) Ann. Rep. Dept. Vet. Sci. and Anim. Husb. Tanganyika. 90-94.]

The author presents the results of an experiment designed to measure the feeding values of the same crop of grass when fed in the green state, after conversion into silage, and after curing into hay. Two sheep were used throughout the investigation and the digestibility trials in each case extended over 14 days. Details of the composition of the grass, silage and hay and their digestibilities are given in seven tables. The general conclusions are that green grass at eleven weeks old has higher starch equivalent and digestible protein values than either silage or hay made from it at that stage of maturity. The silage possessed a higher feeding value than the hay. Delayed cutting of grass for hay results in lowered nutritive value when compared with early cut hay. Allowing mature grass to dry off *in situ* causes a further (25 per cent.) loss in feeding value.

N. J. S.

REVIEW

[**Die Anachorese. Ein biologischer Vorgang. (Anachoresis.)** By Professor A. Ascoli, Director of Instituto Vaccinogeno Antitubercolare, Milan. (1938.) 1-165. (In German with French and English summaries.) A. Milesi e Figli: Milan.]

During recent years Professor Ascoli and his colleagues have concentrated their attention on the phenomenon which they have termed "anachoresis." The original observations of Ascoli were to the effect that calves inoculated intravenously with BCG and then exposed to natural infection with pasteurella and other organisms of this type, were prone to succumb with symptoms and lesions of acute pneumonia. The hypothesis was advanced that the organisms were attracted to the lungs by the innumerable BCG foci and set up a fatal pneumonia. On the other hand, when the vaccine was introduced subcutaneously the pasteurella organisms were drawn to the local site and there destroyed or inactivated. The local BCG swelling appeared, therefore, to exert a similar effect to the "fixation abscess" favoured by the older school of practitioners.

In the present monograph, Ascoli has collected together a number of papers by himself and his co-workers on anachoresis as applied to virulent tubercle bacilli, streptococcal and staphylococcal infections, glanders and actinomycosis. It is shown that the phenomenon is of considerable importance in interpreting the interaction of two or more organisms introduced separately or together.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Sept. 25th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4.30 p.m.

Sept. 26th.—Meeting of Council, N.V.M.A., at 36, Gordon Square, W.C.1, 2.30 p.m.

Nov. 1st.—All changes of address to be reported to Registrar, R.C.V.S.

Nov. 6th.—Provisional commencing date of Animal Management Examination.

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EMERGENCY CHANGES OF ADDRESS

Members are requested to keep Headquarters regularly notified of changes of address. Only thus can they be assured the uninterrupted receipt of the *Veterinary Record*, with its news service for keeping members informed on matters of special interest to them in the existing circumstances. Intimation by Tuesday morning is desired to facilitate the correct despatch of the *Record* dated the ensuing Saturday.

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PRACTITIONERS ON MILITARY SERVICE

Protection of Practices

Members of the Association will be aware that for some time past a committee has been carefully considering the possibility of drawing up a scheme for assisting in carrying on veterinary practices during the absence of practitioners on military service.

This scheme has now been completed and the details are given below. As emphasised previously and in the scheme, the Association relies on the professional integrity of members for its smooth and successful working, confident that every participant will do everything possible to that end.

Maintenance of Practices during Members' Absence on War Service

1. The N.V.M.A. invites all members of the profession who are called up for military service to notify the Secretary if they desire assistance in providing for their practices to be carried on during their absence.

Members should state:—

(*a*) the nature of the practice;

(*b*) whether they require a locum tenens, manager, or assistant;

(*c*) whether any partner or assistant will remain to share the duties.

Members should also undertake to supply a complete list of their clients, specifying whether all animals of the client or only certain of them (*e.g.*, horses, cattle, small animals) have been attended. Notice of the arrangement made should be circulated to all *bona fide* clients of the absentee practitioner.

2. The N.V.M.A. invites all members who are at liberty to undertake the duties of locum, manager, or assistant, to notify the Secretary, stating whether they offer their services for mixed town or country practice, or small-animal practice. Applicants should forward full particulars and copies of recent references.

3. The N.V.M.A. will endeavour to put applicants into touch with suitable assistants, managers, etc. Alternatively, if the member on military service is able to nominate one or more neighbouring practitioners who are willing to assist in carrying on the practice, the N.V.M.A. will get into touch with them and ask them to agree to the plan outlined below.

Members will appreciate that while the Association is prepared to render every assistance and take all possible steps to ensure the smooth working of the scheme, the N.V.M.A. can accept no legal or other responsibilities.

4. The N.V.M.A. suggests as a working plan the following:—

(A) *Locum tenens, Manager, or Assistant.*

(*i*) The conditions of appointment, salary, etc., will be a matter of mutual agreement.

(*ii*) The locum or manager, will, by undertaking the duties, be deemed to agree to the condition that he will not practise either on his own account or as a partner or assistant within the area of the practice for a period of three years after the termination of the appointment or the cessation of hostilities, whichever is the longer period.

(B) *Assistance of Neighbouring Practitioners.*

(*i*) The member who undertakes to assist in carrying on the practice of a member absent on military service should keep a separate day-book into which he should enter all work done for clients of the practice.

(*ii*) At stated intervals, *e.g.*, once every three months, he should submit to the absent member's representative a statement of work done, fees charged, amount received, and amount to be charged as expenses. This statement should be certified by an auditor.

(*iii*) The N.V.M.A. suggests that it would be equitable if the acting practitioner or practitioners would agree to pay over to the representative of the absent practitioner 50 per cent. or an agreed percentage of the net takings for work done on his behalf.

(*iv*) It should be understood that by undertaking these duties the acting practitioner is deemed to agree to the condition that after the return of the member from military service he will not attend animals for any of the clients of the practice during a period of twelve months after the resumption of practice by the member concerned.

(*v*) There is no necessity for executing any formal agreement embodying these provisions. The scheme can best be worked as a gentleman's agreement, the undertaking of the duties being accepted as an undertaking to carry them out in a friendly professional spirit. The N.V.M.A. undertakes, however, to act as arbitrator in settling matters which may be in dispute, and, if the necessity should arise, to refer any matter calling for the intervention of the R.C.V.S., to that body.

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Additional Petrol Supplies for Veterinary Surgeons: "Special Consideration"

On Saturday last it was announced that the Secretary of Mines had reviewed the question of the immediate application of the motor fuel rationing scheme in the light of the fact that many motorists had not yet obtained their books of coupons, and that, in order to avoid hardship to sections of the motoring public, he had decided to postpone the introduction of the rationing scheme for one week.

The Motor Fuel Rationing Order, therefore, comes into force to-day. In the meantime, in response to a letter addressed by the N.V.M.A. to the Petroleum Department of the Mines Department in regard to the provision of additional supplies being made available for members of the profession as a matter of national importance, verbal intimation has been received that in consequence of this representation, a circular has been sent to the Divisional Petroleum Officers instructing them that special consideration is to be given to veterinary surgeons' requests for additional supplies. It would appear, therefore, that veterinarians will be accorded a high degree of priority.

Unfortunately, this decision was not notified to the Regional Petroleum Officers until the end of last week, by which time many applications from members of the profession had already been dealt with. Practising veterinary surgeons

accordingly are advised to appeal against their allocation of petrol. In this connection, the following may be quoted from a letter written by a Regional Petroleum Officer to the Press in his area: "Doctors and veterinary surgeons whose additional ration is definitely inadequate should make a second application giving full details of rations already sanctioned and the further amounts required. The envelopes containing such applications should be conspicuously marked in the top left-hand corner 'Medical,' and they will receive special consideration."

As we go to press, we are informed that a communication has been received by the N.V.M.A. from the Director of the Petroleum Department, stating that, consequent upon the representations made by the Association in its letter of September 5th, in the Petrol Rationing Scheme the veterinary profession has been accorded a degree of priority similar to that of the medical profession. The letter proceeds: "The procedure is for your members to apply for a basic ration and supplemental rations through the ordinary channels, clearly stating the purpose for which additional supplies are requisite."

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CANCELLED ARRANGEMENTS

It is announced in the *British Medical Journal* that owing to the war there will be no annual meeting of the British Medical Association in 1940. It was to have been held at Birmingham.

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It has been decided to postpone the Chadwick Public Lectures which were to have been delivered this autumn, and notice will be given when they are to be resumed.

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DRIVING IN BLACK-OUTS

In the House of Commons on September 15th, Sir J. Nall asked the Minister of Transport whether he would impose, by order, a uniform 20 miles an hour speed limit for all vehicles during the hours of darkness in all built-up and urban areas.

Captain Wallace.—To those who drive with any regard to their own safety or that of others black-out conditions in themselves impose severe restrictions on speed. If any person drives at a speed which is dangerous in all the circumstances, he can be convicted of dangerous driving, and I should prefer to rely on these provisions rather than upon a reduced general limit of speed.

Sir J. Nall.—Does the right hon. gentleman realise that there is a very grave danger at the present time, and that a great many travellers are not exercising that care?

Captain Wallace.—I entirely agree, but I do not think the imposition of a speed limit of 20 m.p.h. will achieve the object.

FUTURE OF RACING

The *Racing Calendar* states that Lord Harewood informed the Jockey Club that, from information which he had received, no racing would be possible before October 16th at the earliest. It was then decided that the remaining fixtures for the year should be cancelled. On the resumption of racing fixtures would be given to those meetings where the authorities granted permission for races to be held, and fresh programmes would be drawn up.

Entries for future races at Newmarket which usually close in October and November will, this year, close on December 12th.

The National Hunt Committee also decided that the remaining fixtures for this year should be cancelled and that any new meetings should be on the same lines as those to be arranged by the Jockey Club.

Owing to the temporary cessation of racing the *Racing Calendar* will not be published every week.

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FARMING IN WAR TIME

"The war has come at a time of the year that gives farming the best possible opportunity to prepare for the great effort it must now make in the defence of our country," observes the Ministry of Agriculture in the course of a recent announcement. "Harvest is nearly finished, and has turned out better than at one time seemed possible. Given reasonable weather, farmers will be able to push on with their normal early cultivations and supplement them with ploughing up even more land, for another 1,500,000 acres of land must be brought under the plough this coming year. It is an ambitious programme, for we are attempting in one year what we only achieved in four years in the last war.

"But this time things are different. Plans are ready: food and feeding stuffs, fuel and other requisites are stored against such an emergency. We not only have 60,000 tractors in private hands, but also a reserve stock ready to be released. We enter the conflict in a far better position for ploughing up Britain than we were even at the end of 1918, when the last national effort had reached its height.

"But although we have these reserve supplies and the country contains more wheat than ever it had before, we shall obviously have to nurse these stocks so that we may continue to enjoy the same feeling of confidence in any conceivable emergency that may arise out of the chances of war. The prudent producer of stock would do well to begin thinking at once about growing more of his own feeding stuffs, economising, and finding substitute rations.

"*Horses.*—Working horses should be fed to keep them fit for their work, but this can be done on a smaller allowance of concentrated food than is often used.

"*Dairy Cattle.*—The milk supply must be maintained, but economies can be made by adjusting the ration to the yield and by regular checking of the ration. Particularly is this important when feeding concentrates to cows at grass. Cows should be fed as far as possible upon home-grown food such as grass, forage crops, roots, hay, straw, oats and pulse.

"*Other Cattle.*—It is obvious that cattle with bloom will not be so numerous as in the past: in fact, to effect saving strict economy is necessary if cake and concentrated foods are to be given to store cattle. Furthermore, the finish

to which we are accustomed will not be possible in the present emergency.

"*Sheep.*—Sheep should be fattened as far as possible on food grown on the farm, with a minimum of cake or corn.

"*Pigs.*—Pig-keepers might get their pigs accustomed more and more to green stuffs, potatoes, roots, scraps and waste generally. Recent experiments have proved that a green food diet for pigs will make possible a great saving of meal.

"*Poultry.*—As the Minister of Agriculture pointed out in his recent broadcast appeal, the kitchen garden and allotment can provide much material unsuitable for human consumption that will help to feed poultry. But it must be properly prepared and supplemented with a properly balanced ration of mash and grain. Experiments indicate that cooked potatoes may be fed to laying hens up to at least one-sixth of their feed requirements."

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Farming Controlled From Whitehall

"Within the last ten days the whole face of British farming has been transformed," states the *Farmers' Weekly* of September 15th. "The industry, down to the smallest detail, has been brought under a degree of Government control which has never been experienced before, and which only a few weeks ago would have been unthinkable. Maximum prices have been fixed for many of the things the farmer has to buy or to sell. Within certain limits he will be told what he may or may not grow. Most of his younger employees may be taken away and replaced by labour which, in many cases, will be less efficient. Powers have been taken to ensure that all land is efficiently farmed. Much as farmers dislike the thought of compulsion in any shape or form they will willingly agree to submit to it in the present emergency. Many will even go further and admit to a feeling of relief that they are at last being given a lead by an authority which knows what it wants and says so.

"One way and another the Ministry of Agriculture used to come in for a good deal of criticism under peace conditions. But we must all acknowledge that someone was working quietly, but very hard, to account for the flood of war-time regulations which have descended on us almost from the word 'Go.' These regulations are remarkable not only for their number, but for their detail. They have certainly taken control of farming at Whitehall."

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LIVESTOCK PRICE POLICY

The Government has announced its plans for controlling livestock prices. An Order has been made fixing the maximum prices for fat cattle, calves and sheep. All sales of such stock for slaughter are required to be made through livestock markets—generally speaking those where cattle certification is in force—and direct sales of such animals off the farm will be prohibited. There will be no sale by auction. Grading and certification of cattle for subsidy will be continued for the present, and subsidy payments will continue to be made and will be additional to the sale price. With regard to pigs, a flat price has been fixed.

The general meat supply situation is, it is stated, satisfactory. In due course, the Government will take over complete control, and all purchases of livestock for slaughter will be made on Government account. In the meantime, farmers are asked to maintain the orderly marketing of their stock in the normal quantities through the appointed markets, and to co-operate in every way in securing the smooth working of the various stages of control as they are brought into operation.

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The plans prepared by the Food (Defence Plans) Department for the control of meat and livestock in the event of war provided that wholesalers of meat should become members of Area Wholesale Meat Supply Associations which would act as agents of the Food Controller for the wholesale distribution of meat.

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As an interim measure to assist in the distribution of animal feeding stuffs to corn and agricultural merchants, merchants have agreed, at the request of the Food (Defence Plans) Department, to convene in each administrative county small committees of merchants. It is hoped that animal feeding stuffs will continue to be distributed through normal trade channels. In order to remove any possible doubt the Food (Defence Plans) Department wish to emphasise that it is not proposed to requisition stocks in the hands of merchants other than stocks in excess of a certain minimum tonnage at ports and in railway warehouses.

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PERSONAL

Foot-and-Mouth Disease Research Committee

Dr. Ian A. Galloway's Appointment

We have pleasure in announcing the selection by the Foot-and-Mouth Disease Research Committee of the Ministry of Agriculture of Dr. Ian A. Galloway, M.R.C.V.S., for appointment to their new post of Scientific Superintendent.

In making the appointment the Committee expressed the desire that the relations between the Scientific Superintendent and the Committee should be close and direct. The Superintendent would be responsible to the Committee for the research staff and for the conduct of the scientific work in progress at the Experimental Station, Pirbright. It was decided originally that the appointment would be dependent on the date on which it would be convenient for Dr. Galloway to take up his new duties. However, in view of the exigencies of the present state of national emergency he was persuaded to take charge at the experimental station of the Committee immediately, the appointment to date from September 1st, 1939.

Educated at Heriot's School and Edinburgh University, Ian Galloway graduated from the "Dick" College in December, 1922. Securing his B.Sc. in March, 1923, in 1938 he was awarded his Doctorate in Science for the thesis "Studies of Certain Viruses Pathogenic for Man and Animals." Holder of the Ministry of Agriculture's Research Scholarship, 1923-26, he worked during the earlier part of his period of tenure of this scholarship at the Ministry's Laboratory at New Haw, then attending the Cours de Microbiologie at the Pasteur Institute, Paris. While there, he decided

to specialise in virus studies and became research assistant to Professor C. Levaditi, working on vaccina, herpes, rabies, encephalitis, etc. During this period he visited several research centres in Germany, including the Foot-and-Mouth Disease Research Station on the Insel Riems.

In October, 1926, Mr. Galloway was appointed Research Officer to the Foot-and-Mouth Disease Research Committee and became attached to the staff of the National Institute of Medical Research of the Medical Research Council. In addition to carrying out investigations on behalf of the Committee, he has made studies on other virus diseases including rabies, Aujeszky's disease, herpes, poliomyelitis, Borna disease, louping-ill, vesicular stomatitis, equine encephalomyelitis (American and Russian strains of virus), also on so-called "fowl paralysis." On numerous occasions Dr. Galloway has visited, on behalf of the Committee, research centres on the Continent at which foot-and-mouth disease is being investigated, while he has also had opportunities of investigating the disease in the field during epizoötics on the Continent. He has made an extensive study of the different methods of control adopted in this country and abroad. In 1936 he officiated as Secretary of the Sectional Committee on Viruses of the Second International Congress of Microbiology. He is the holder of the Prix Bréant, having, in 1930, gained the distinction of Lauréat de l'Academie des Sciences (Institut de France).

Dr. Galloway, who is in membership of numerous scientific societies, has for several years rendered valuable service as a member of the Editorial Committee, N.V.M.A.

In 1927 he married Mademoiselle Geneviève Zwilling, Licenciée ès Sciences, Research Assistant at the Pasteur Institute.

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Birth.—Begg.—On September 16th, 1939, at Marvel House, Newport, Isle of Wight, to Mary Grace, wife of G. Warnock Begg, M.R.C.V.S., a daughter.

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Marriage.—Owing to the war the marriage took place quietly on Wednesday, September 13th, at St. Michael's Church, Retford, between Mr. George Edward Hurst, elder son of Mr. and Mrs. G. Hurst, of Crantock, Ordsall Park Road, Retford, and Miss Joan Elisabeth Hudson, younger daughter of Mr. Richard Hudson, F.R.C.V.S., and Mrs. Hudson, St. Michael's Place, Retford.

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Professor Share Jones, D.V.Sc., F.R.C.V.S., of Pentrebychan Hall, near Wrexham, chairman of Wrexham Rural District Council, has placed his residence at the disposal of blind persons evacuated from danger areas.

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R.C.V.S. OBITUARY

Davies, Joseph, Ponthafren, Newtown, Co. Montgomery. Graduated Edinburgh, July 9th, 1919. Died September 11th, 1939; aged 43 years.

Parks, Ernest William, O.B.E., T.D., (T.F.) (retd.), 1, London Road, Wellingborough, Northants. Graduated London, December 25th, 1895. Died September 12th, 1939; aged 65 years.

Lieut.-Colonel E. W. Parks, O.B.E., T.D., M.R.C.V.S.

Lieut.-Colonel Parks, whose death we record with much regret, had a distinguished military career. He served in the South African War and in 1899 was instrumental in raising the Wellingborough troop of the Northampton Squadron of the Royal Bucks Hussars. In 1902 he assisted in the formation of the Northants Imperial Yeomanry and was appointed Veterinary Lieutenant. Afterwards he was transferred to the Royal Veterinary Corps (T.F.), received the rank of Captain in 1909, and of Major in 1915.

When the European War broke out he was a member of the Wellingborough Urban Council. He mobilised with the County Yeomanry on August 14th, 1914, and served throughout the War with the cavalry. He was Assistant Director of Veterinary Services on the Divisional Staff from November, 1915, until April 1st, 1919.

Twice he was mentioned in despatches from the late Field Marshal Haig (for gallant and distinguished services in the field on April 9th, 1917, and November 8th, 1918), and received his O.B.E. (military) decoration in January, 1919.

Lieut.-Colonel Parks was the Veterinary Inspector, under the Milk and Dairies Order, for the Wellingborough Joint Dairies' Committee from 1919 until this year, when the administration changed, and he became Inspector under the Order, to the Wellingborough Urban Council. He was the Ministry of Agriculture's Inspector at Wellingborough Cattle Market and Hon. Veterinary Surgeon to the Wellingborough Christmas Fat Stock Show Society.

A Sussex man, and the son of a well-known farmer and cattle breeder, Lieut.-Colonel Parks was 65, and a bachelor. He went to Wellingborough about 44 years ago, and purchased the practice of the late Mr. Benjamin Aris, subsequently taking over the practices of the late Mr. John Bainbridge and the late Mr. J. Rowland Dykes.

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HEALTH OF CANADIAN LIVESTOCK

For the last 18 years, according to a Press bulletin issued by the High Commissioner for Canada, Canadian horses have been free of the æquine disease of dourine, and there has been no case of scab among sheep for the past 10 years. No rabies, glanders or hog cholera appeared in Canada during 1938. In the prevention of bovine tuberculosis, there are 9414 accredited herds and about one-third of the cattle in the Dominion are under supervision for eradication of tuberculosis. A total of 2,019 herds of cattle has been tested for Bang's disease and 764 herds have been listed as being free from that disease for the period of one year. This is only part of the comprehensive work of the Health of Animals Division, Dominion Department of Agriculture, which is responsible for the prevention of the entrance of animal disease into Canada, for the maintenance of the health of Canada's livestock, and for the quality of meat and meat products for home consumption and export. The responsibility for the administration of the Animals Contagious Diseases Act and the Meat and Canned Foods Act rests with the Division. Under the provisions of the latter Act, during the year ended March 31st, 1939, the Division's officers inspected before and after slaughter 6,081,999 animals destined for food, and 83 establishments manufacturing meat foods as part of their daily task.